What is claimed is:

1. A method for adaptively enhancing a color comprising:

(a) deriving a saturation component from an input image;

(b) determining a saturation enhancement function used to enhance the saturation of the input image according to a predetermined reference value;

(c) changing the derived saturation component using the saturation enhancement function;

(d) generating an output color value by synthesizing the changed saturation component and other components of the input image; and

(e) generating an output image based upon the output color value.

2. The method of claim 1, wherein step (a) comprises;

(a1) converting an input image represented in a first color space into an image in a second color space where the saturation of the input image can be extracted; and

(a2) deriving the saturation component from the converted input image.

3. The method of claim 1, wherein according to the saturation enhancement function, the amounts by which the saturation of an input pixel in a low-saturation region is enhanced and by which the saturation of an input pixel in a high-saturation region are different.

4. The method of claim 1, wherein the saturation enhancement function is determined based on the characteristics of the input image.

5. The method of claim 4, wherein step (b) comprises:

(b1) extracting an average saturation of the input image from color signals of the input image;

(b2) determining a saturation enhancement function determining variable based on the average saturation; and

(b3) determining the saturation enhancement function based on the saturation enhancement function determining variable.

6. The method of claim 5, wherein the saturation enhancement function determining variable is determined using the following equation:

$$a = A(S_{avg})$$

where a and S_{avg} represent the saturation enhancement function determining variable and an average saturation of the input image, respectively.

7. The method of claim 5, wherein the saturation enhancement function determining variable and the saturation enhancement function are determined using the following equations:

$$a = A(S_{avg})$$
$$S_o = F(S_i) = \frac{(a+1)S_i^2}{a+S_i^2}$$

where $F(x)$, a, S_{avg}, S_i, and S_o represent the saturation enhancement function, the saturation enhancement function determining variable, an average saturation of the input image, saturation of the input image, and saturation of the output image, respectively.

8. The method of claim 5, wherein the saturation enhancement function determining variable and the saturation enhancement function are determined using the following equations:

$$a = A(S_{avg})$$
$$S_o = F(S_i) = S_i + a \times \Delta$$
$$\Delta = \frac{K \times S_i^2}{(K-1)+S_i^2} - S_i$$

where $F(x)$, a, S_{avg}, S_i, S_o, and K represent the saturation enhancement function, the saturation enhancement function determining variable, an average saturation of the input image, saturation of the input image, saturation of the output image, and an arbitrary constant, respectively.

9. The method of claim 5, wherein a maximum of the saturation enhancement function determining variable is determined based upon the visual perception characteristics of a predetermined color difference formula in a CIEL*a*b* color space.

10. The method of claim 9, wherein the color difference formula is defined by the following equation:

$$\Delta E_{LH} = \sqrt{\Delta L^2 + \Delta H^2}$$

where ΔH and ΔL represent variations in hue and lightness, respectively.

11. The method of claim 1, wherein the second color space is an HSV color space or a YCbCr color space.

12. The method of claim 1, wherein the saturation enhancement function in step (b) is determined based upon a preferred saturation enhancement value input from a user.

13. The method of claim 12, wherein step (b) comprises:

(b1) receiving the preferred saturation enhancement value from the user;

(b2) determining a saturation enhancement function determining variable based upon the preferred saturation enhancement value; and

(b3) determining the saturation enhancement function based upon the saturation enhancement function determining variable.

14. The method of claim 13, wherein the saturation enhancement function determining variable is determined using the following equation:

$$a = A(a_{user})$$

where a and a_{user} represent the saturation enhancement function determining variable and a user-preferred saturation value, respectively.

15. The method of claim 13, wherein the saturation enhancement function determining variable and the saturation enhancement function are determined using the following equations:

$$a = A(a_{user})$$
$$S_o = F(S_i) = \frac{(a+1)S_i^2}{a+S_i^2}$$

where $F(x)$, a, a_{user}, S_i, and S_o represent the saturation enhancement function, the saturation enhancement function determining variable, a user-preferred saturation value, saturation of the input image, and saturation of the output image, respectively.

16. The method of claim 13, wherein the saturation enhancement function determining variable and the saturation enhancement function are determined using the following equations:

$$a = A(a_{user})$$
$$S_o = F(S_i) = S_i + a \times \Delta$$
$$\Delta = \frac{K \times S_i^2}{(K-1)+S_i^2} - S_i$$

where $F(x)$, a, a_{user}, S_i, S_o, and K represent the saturation enhancement function, the saturation enhancement function determining variable, a user-preferred saturation value, saturation of the input image, saturation of the output image, and an arbitrary constant, respectively.

17. The method of claim 13, wherein a maximum of the saturation enhancement function determining variable is determined based upon the visual perception characteristics of a predetermined color difference formula in a CIEL*a*b* color space.

18. The method of claim 17, wherein the color difference formula is defined by the following equation:

$$\Delta E_{LH} = \sqrt{\Delta L^2 + \Delta H^2}$$

where ΔH and ΔL represent variations in hue and lightness, respectively.

19. An apparatus for adaptively enhancing the color of an image, comprising:

a saturation component deriving unit for deriving a saturation component from an input image;

a saturation enhancement function determining variable calculator for determining a saturation enhancement function used to enhance the saturation of the input image based upon a predetermined reference value;

a saturation enhancement unit for changing the derived saturation component using the saturation enhancement function; and

a saturation component synthesizing unit for synthesizing the changed saturation component and other components of the input image and generating an output image based upon the synthesized components.

20 The apparatus of claim 19 further comprising:

a first color converter for converting the input image represented in a first color space into an image in a second color space where the saturation of the input image can be extracted; and

a second color converter for converting the output image represented in the second color space into an image in the first color space.

21. The apparatus of claim 19 further comprising a frame saturation average calculator which calculates an average saturation of the input image that is provided to the saturation enhancement function determining variable calculator as the reference value.

22. The apparatus of claim 19, wherein the saturation enhancement function determining calculator determines the saturation enhancement function by which the amounts by which the saturation of an input pixel in a low-saturation region is enhanced and by which the saturation of an input pixel in a high-saturation region is enhanced are different.

23. The apparatus of claim 19, wherein the saturation enhancement function determining variable calculator determines the saturation enhancement function based upon the characteristics of the input image.

24. The apparatus of claim 19, wherein the reference value is the average saturation of the input image, and the saturation enhancement function determining variable calculator determines the saturation enhancement function determining variable based upon the average saturation of the input image and determines the saturation enhancement function based upon the saturation enhancement function determining variable.

25. The apparatus of claim 24, wherein the saturation enhancement function determining variable calculator determines the saturation enhancement function determining variable using the following equation:

$$a = A(S_{avg})$$

where a and S_{avg} represent the saturation enhancement function determining variable and an average saturation of the input image, respectively.

26. The apparatus of claim 24, wherein the saturation enhancement function determining variable calculator determines the saturation enhancement function determining variable and the saturation enhancement function using the following equations:

$$a = A(S_{avg})$$

$$S_o = F(S_i) = \frac{(a+1)S_i^2}{a + S_i^2}$$

where $F(x)$, a, S_{avg}, S_i, and S_o represent the saturation enhancement function, the saturation enhancement function determining variable, an average saturation of the input image, saturation of the input image, and saturation of the output image, respectively.

27. The apparatus of claim 24, wherein the saturation enhancement function determining variable calculator determines the saturation enhancement function determining variable and the saturation enhancement function using the following equations:

$$a = A(S_{avg})$$
$$S_o = F(S_i) = S_i + a \times \Delta$$
$$\Delta = \frac{K \times S_i^2}{(K-1) + S_i^2} - S_i$$

where $F(x)$, a, S_{avg}, S_i, S_o, and K represent the saturation enhancement function, the saturation enhancement function determining variable, an average saturation of the input image, saturation of the input image, saturation of the output image, and an arbitrary constant, respectively.

28. The apparatus of claim 24, wherein a maximum of the saturation enhancement function determining variable is determined based upon the visual perception characteristics of a predetermined color difference formula in a CIEL*a*b* color space.

29. The apparatus of claim 28, wherein the color difference formula is defined by the following equation:

$$\Delta E_{LH} = \sqrt{\Delta L^2 + \Delta H^2}$$

where ΔH and ΔL represent variations in hue and lightness, respectively.

30. The apparatus of claim 19, wherein the saturation enhancement function determining variable calculator determines the saturation enhancement function based upon a preferred saturation enhancement value input from a user.

31. The apparatus of claim 19, wherein the reference value is a preferred saturation enhancement value input from a user, and the saturation enhancement function determining variable calculator determines the saturation enhancement function determining variable based upon the preferred saturation enhancement value input from the user and the saturation enhancement function based upon the saturation enhancement function determining variable.

32. The apparatus of claim 31, wherein the saturation enhancement function determining variable calculator determines the saturation enhancement function determining variable using the following equation:

$$a = A(a_{user})$$

where a and a_{user} represent the saturation enhancement function determining variable and a user-preferred saturation value, respectively.

33. The apparatus of claim 31, wherein the saturation enhancement function determining variable calculator determines the saturation enhancement function determining variable and the saturation enhancement function using the following equations:

$$a = A(a_{user})$$

$$S_o = F(S_i) = \frac{(a+1)S_i^2}{a + S_i^2}$$

where $F(x)$, a, a_{user}, S_i, and S_o represent the saturation enhancement function, the saturation enhancement function determining variable, a user-preferred saturation value, saturation of the input image, and saturation of the output image, respectively.

34. The apparatus of claim 31, wherein the saturation enhancement function determining variable calculator determines the saturation enhancement function determining variable and the saturation enhancement function using the following equations:

$$a = A(a_{user})$$
$$S_o = F(S_i) = S_i + a \times \Delta$$
$$\Delta = \frac{(K \times S_i^2)}{(K-1)+S_i^2} - S_i$$

where $F(x)$, a, a_{user}, S_i, S_o, and K represent the saturation enhancement function, the saturation enhancement function determining variable, a user-preferred saturation value, saturation of the input image, saturation of the output image, and an arbitrary constant, respectively.

35. The apparatus of claim 31, wherein a maximum of the saturation enhancement function determining variable is determined based upon the visual perception characteristics of a predetermined color difference formula in a CIEL*a*b* color space.

36. The apparatus of claim 35, wherein the color difference formula is defined by the following equation:

$$\Delta E_{LH} = \sqrt{\Delta L^2 + \Delta H^2}$$

where ΔH and ΔL represent variations in hue and lightness, respectively.

37. The apparatus of claim 20, wherein the second color space is an HSV color space or a YCbCr color space.

38. A computer-readable recording medium on which a program enabling the method of claim 1 to be executed in a computer or digital display device is recorded.